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MODEL ETH-DIO-48 AND ETH-DIO-24 ETHERNET DIGITAL INPUT/OUTPUT MODULES

USER MANUAL

FILE: ETH-DIO-48.A1n

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WARNING!!

ALWAYS CONNECT AND DISCONNECT YOUR FIELD CABLING WITH THE COMPUTER POWER OFF. ALWAYS TURN COMPUTER POWER OFF BEFORE INSTALLING A CARD. CONNECTING AND DISCONNECTING CABLES, OR INSTALLING CARDS INTO A SYSTEM WITH THE COMPUTER OR FIELD POWER ON MAY CAUSE DAMAGE TO THE I/O CARD AND WILL VOID ALL WARRANTIES, IMPLIED OR EXPRESSED.

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Table of Contents

Chapter 1: Introduction 5
- **Features** 5
- **Typical Applications** 5
- **Functional Description** 6
  - **Figure 1-1: Block Diagram** 6
- **Ordering Guide** 7
- **Model Options** 7
- **Special Order** 7
- **Included with your board** 7
- **Optional Accessories** 8

Chapter 2: Installation 9
- **Software CD Installation** 9
- **Hardware Installation** 9

Chapter 3: Hardware Details 10
- **Option Selections** 10
  - **Figure 3-1: 48 Channel Board Option Selection Map** 10
- **Ethernet Connector** 10
- **LED** 10
- **DC Power Jack** 10
- **DC Power Screw Terminals** 11
- **50 Pin Box Headers** 11
- **5V Resettable Fused Outputs** 11
- **Pull-Up / Pull-Down Configuration Jumpers** 11

Chapter 4: Ethernet Address Information 12

Chapter 5: Programming 13
- **Client API** 13
  - **AEW_Connect()** 13
  - **AEW_Disconnect()** 13
  - **AEW_GetStatus()** 13
  - **AEW_DIO_Configure()** 13
  - **AEW_DIO_WriteAll()** 13
  - **AEW_DIO_ReadAll()** 13
- **Packet Structure** 14
  - **Table 5-1: Packet Type Definitions** 14

Chapter 6: Connector Pin Assignments 15
  - **Table 6-1: 50-Pin Connector Pin Assignments** 15
  - **Table 6-2: I/O Connector Signal Names, Directions and Descriptions** 15

Chapter 7: Specifications 16

Customer Comments 17

Chapter 1: Introduction

Features

- Ethernet 10/100 RJ45 connector for interfacing to CPU or network
- 48 or 24 channel high-current TTL digital I/O lines
- Compatible with industry standard I/O racks such as Grayhill, Opto 22, Western Reserve Controls, etc.
- Eight-bit ports software selectable for inputs or outputs
- All 48 digital I/O lines buffered with 32mA source / 64mA sink current capabilities
- Jumper selectable I/O pulled up to 5V (via 10KΩ) for contact monitoring, pulled down to ground or floating
- Resettable 0.5A fused +5VDC output per I/O connector
- OEM version (board only), features PC/104 size and mounting compatibility
- Small, (4” x 4” x 1.7”) rugged, steel industrial enclosure

Typical Applications

- Automatic Test Systems
- Kiosks
- Laboratory Automation
- Robotics
- Machine Control
- Security Systems, Energy Management
- Relay Monitoring and Control
- Parallel Data Transfer to PC
- Sensing Switch Closures or TTL, DTL, CMOS Logic
- Driving Indicator Lights or Recorders

Functional Description

This Ethernet board is an ideal solution for adding portable, easy-to-install digital I/O capabilities to any computer or network.

The board features 48 bits of TTL-compatible digital I/O with high-current capabilities. Each digital port can be programmed to accept inputs or to drive outputs in 6 groups of 8-bit ports. The I/O wiring connections are via two industry standard 50-pin connectors. For external circuits, fused +5VDC power is available at each I/O connector on pin 49. There is one resettable fuse for both connectors. The resettable fuse is rated at 0.5A.

All I/O lines are buffered by a type 74ABT543A tristate buffer transceiver capable of sourcing 32 mA or sinking 64 mA. The buffers are configured under program control for input or output. I/O Lines are jumper selectable with pull-ups (to +5 VDC via 10KΩ) or with pull-downs (to ground).

5VDC power is supplied to the card by an included external power adaptor via a DC power jack, or two-position screw terminal.

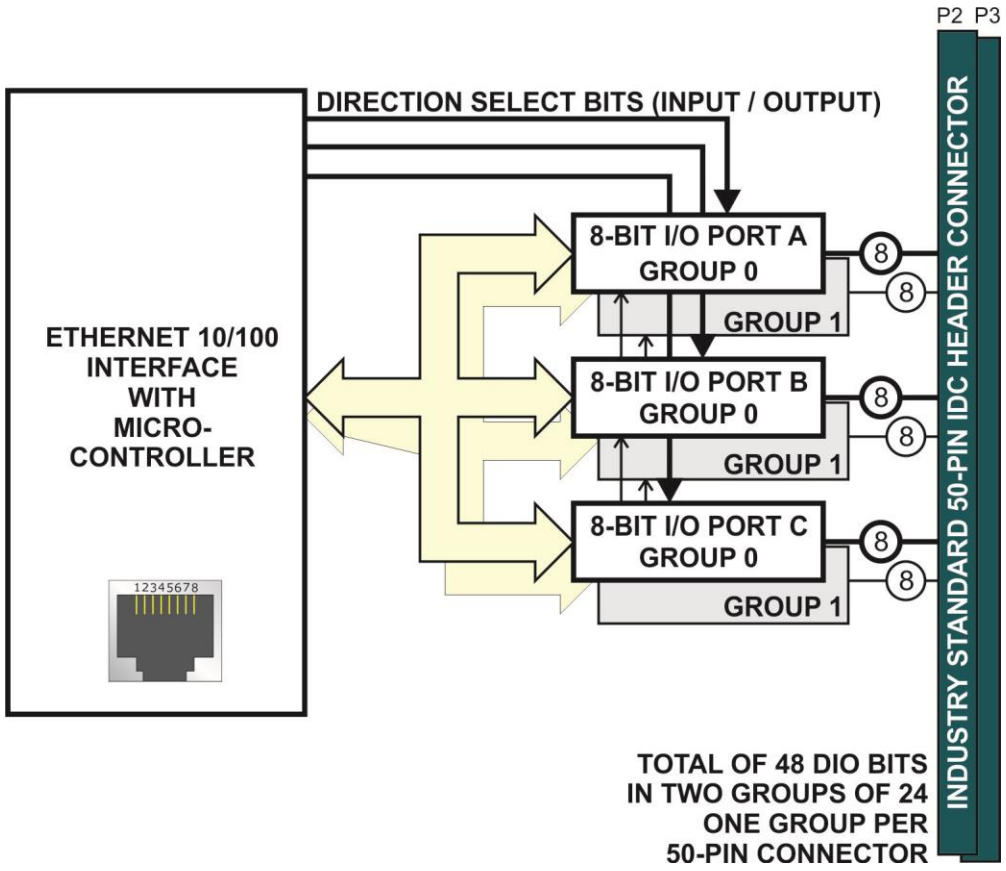


Figure 1-1: Block Diagram

Ordering Guide

- ETH-DIO-48 48-digital input/outputs w/DC jack & external power adaptor in enclosure
- ETH-DIO-24 24-digital input/outputs w/DC jack & external power adaptor in enclosure

Model Options

- -LV Low voltage I/O (LVTTL) for 3.3V systems
- -OEM Board only version with no enclosure or external power supply
- -T Extended operating temperature of -40 to +80 ˚C
- -RoHS This product is available in a RoHS compliant version. Please call for specific pricing then add this suffix to the model number on any purchase orders.

Special Order

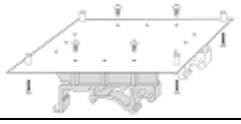
Contact factory with your special requirement. Examples of special orders would be conformal coating, right angle or latching I/O headers etc.

Included with your board

The following components are included with your shipment, depending on options ordered. Please take the time now to ensure that no items are damaged or missing.

- ETH Module in labeled enclosure with an anti-skid bottom
- Software Master CD
- 5V Regulated AC/DC Power Adapter

Optional Accessories

• CAB50F-6	Six-foot ribbon cable assembly with 50-pin female connectors	
• CAB50-6	Six-foot ribbon cable assembly with a 50-pin female header connector and a 50-pin female edge connector	
• STB-50	Screw terminal board, typically ships with standoffs but can also mount on SNAP-TRACK or DIN-SNAP	
• STB-48CH	50-Pin Multi-Header Universal Screw Terminal Board with steel powder coated enclosure for up to 48 Digital I/O Channels	
• STB-DIO-48-ETH	Plug-in Spring-Cage Terminal Board for 48 Digital I/O Channels (used inside enclosure for ETH-DIO-48)	
• IIB-24	24-Channel Optically Isolated Input Board	
• ROB-24	24-Channel Electromechanical Relay Board	
• DIN-SNAP-6	Six inch length of SNAP-TRACK with two clips, for mounting one STB-50 screw terminal board on a DIN rail	
• DIN-SNAP	One foot length of SNAP-TRACK with four clips, for mounting up to two STB-50 screw terminal boards on a DIN rail	
• MP104-DIN	DIN-rail mounting adapter plate for affixing any ETH/104 module to a DIN-rail	

Chapter 2: Installation

Software CD Installation

The software provided with this board is contained on one CD and must be installed onto your hard disk prior to use. To do this, perform the following steps as appropriate for your software format and operating system. Substitute the appropriate drive letter for your CD-ROM or disk drive where you see D: in the examples below.

Windows

a. Place the CD into your CD-ROM drive.
b. The install program should automatically run. If it does not click START | RUN and type D:INSTALL, click OK or press Enter.
c. Follow the on-screen prompts to install the software for this board.

Hardware Installation

The board can be installed on any Ethernet network or even just connected directly to a NIC in your PC. Installing the Ethernet module is as simple as connecting power, then the Ethernet cable itself. You'll know it worked if you see the link/activity light on the Ethernet connector housing light/blink. If you do not see activity, check the other end of the Ethernet cable to ensure it is plugged into your LAN switch/router/gateway/hub/ or directly into your PC.

This Ethernet module ships preconfigured at a factory-default IP address and networking configuration (listed in Chapter 4: Addressing). The *Settings* program allows you to change the module's networking configuration to match your LAN requirements. However, in order to use the Settings program you will need a Windows computer connected to the same subnet as the Ethernet module. (You can modify a Windows PC's networking configuration temporarily if needed, contact an IT support staffer if you need assistance with this.)

Any networking configuration changes made via the *Settings* program will be entered into the onboard non-volatile memory and used at each power-on or reset in the future, as well as taking immediate effect.

If necessary you can reset the module to the factory default networking configuration by briefly shorting the OPT1 jumper position while power is applied. (You may need to open the device' enclosure to reach the OPT1 jumper).

Chapter 3: Hardware Details

Option Selections

Refer to the settings program on the CD provided with the board. Also, refer to the Block Diagram and the Option Selection Map when reading this section of the manual.

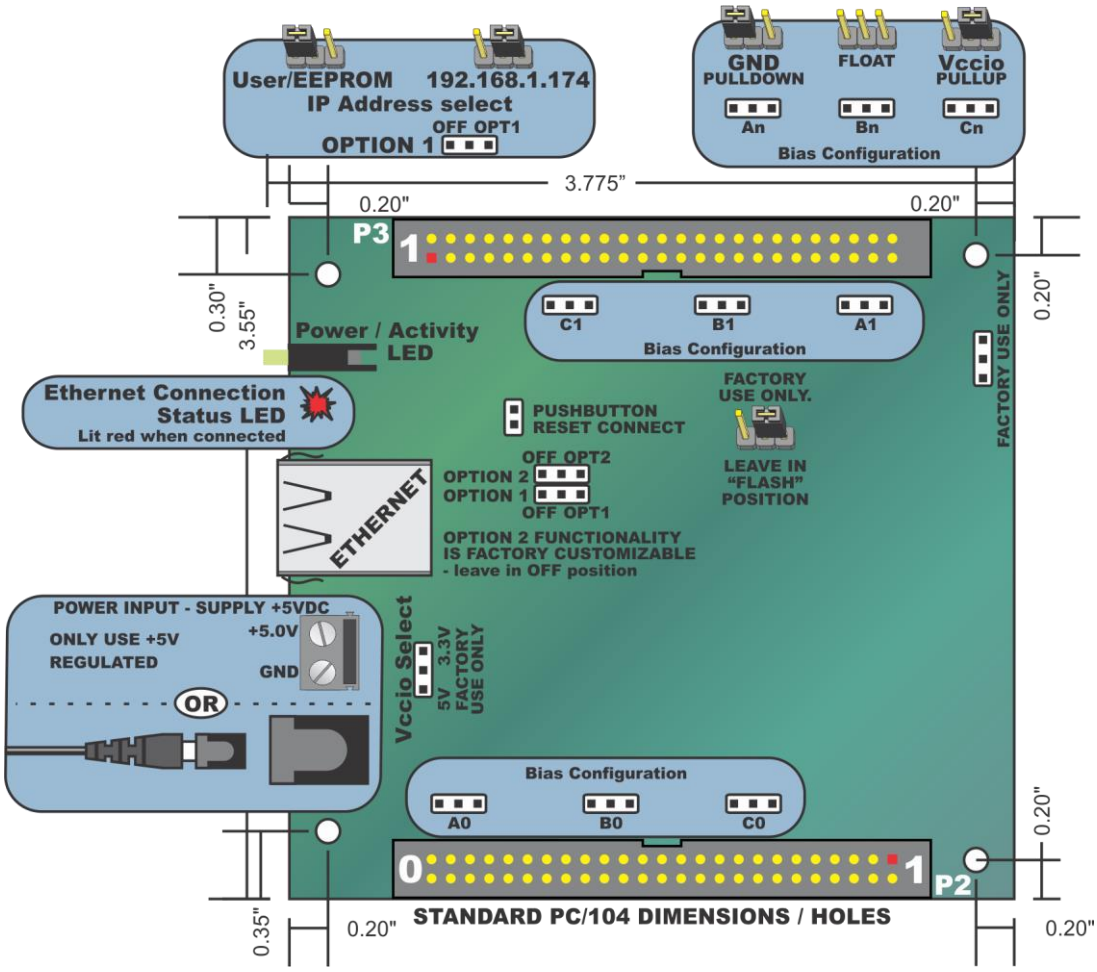


Figure 3-1: 48 Channel Board Option Selection Map

Ethernet Connector

The Ethernet Connector is an industry standard RJ45 10/100 Base T type with integrated transmit / receive LEDs.

LED

The LED on the front of the enclosure is used to indicate power/activity.

DC Power Jack

The DC jack has a 2.00mm post and is designed to be used with the AC/DC regulated 5V external power supply shipped with the standard unit.

DC Power Screw Terminals

If a more secure retention method of providing the unit with power is desired, use these clearly marked screw terminals to connect regulated 5VDC.

50 Pin Box Headers

The 50 pin box headers have standard 0.100" spacing between pins and are keyed to prevent improper connections. It can be used with standard IDC type ribbon cables.

5V Resettable Fused Outputs

One 0.5A resettable fuse feeds two I/O connectors at pin 49 used to power external module racks or relay boards and such. If an over-current persists on a circuit protected by a resettable fuse, it will open, interrupting power to the circuit. Response time depends on over-current level and ambient temperature, humidity, etc. The fuse will remain open until the bi-metal elements cool sufficiently, at which time the circuit will be restored.

Pull-Up / Pull-Down Configuration Jumpers

For “Bias Configuration” (see option selection map or settings program for assistance) one configuration jumper is used per 8-bit port (A0, B0 and C0 for P2 / Group 0, and A1, B1 and C1 for P3 / Group 1); there are a total of six jumpers on the board. The I/O lines are either pulled up to +5V via 10KΩ (for dry-contact monitoring) or pulled down (for positive control logic applications). When no jumpers are installed, the lines are left floating, however due to the 10K resistor packs any un-used input will not have suppressed cross-talk. For pull-ups (most common), install these jumpers in the +5V position. For pull-downs, install these jumpers in the GND position. For neither, remove these jumpers.

Chapter 4: Ethernet Address Information

Use the provided AIOETHW.dll driver to access the Ethernet board.

The unit is shipped from the factory with a default static IP address: **192.168.1.174**

Most customers will wish to change this IP address and related network configuration. Our Settings... program can assist with this process in Windows.

For your information, the device listens on port 51936 for normal operation, and listens on 51937 for upgrading onboard firmware should it become necessary. Under very rare circumstances you may need to modify your network settings to allow access to these ports.

The firmware supports at most six simultaneous connections during normal operation.

Chapter 5: Programming

Client API

To install the client, simply copy AIOETHW.dll next to the program that will use it, or to the 32-bit system directory.

The general sequence to use it is:

- AEW_Connect() to open a connection.
- AEW_DIO_Configure() to set the initial digital input vs output configuration, and disable the tristate.
- Repeated I/O calls, using AEW_DIO_WriteAll()/AEW_DIO_Write1(), AEW_DIO_ReadAll().
- AEW_Disconnect() to close the connection when done.

If the connection fails during operation, a new connection can be swapped in, like this:

- AEW_Disconnect() to close the old connection.
- AEW_Connect() to open a new connection.
- Resume with the I/O calls.

The following is a brief reference of common AIOETHW.dll functions.

AEW_Connect()

AEW_Connect() connects to the specified host device. It returns a client reference (like a handle) that represents the connection, or zero on a failure.

AEW_Disconnect()

AEW_Disconnect() disconnects a client reference, closing the connection and cleaning up any memory used. After being passed to AEW_Disconnect(), the client reference is invalid.

AEW_GetStatus()

AEW_GetStatus() reads the device's status block.

AEW_DIO_Configure()

AEW_DIO_Configure() sets the direction of the DIO bytes, writes to all of them, and then disables the tristate. Writes to input bytes are ignored.

AEW_DIO_WriteAll()

AEW_DIO_WriteAll() writes to all the DIO.

AEW_DIO_ReadAll()

AEW_DIO_ReadAll() reads from all the DIO.

For a complete AIOETHW.dll API reference please refer to the HTML API reference installed in your software directory.

Low Level Interface Information

The following information is provided for users who cannot or choose to not use AIOETHW.dll. This is necessary in non-windows operating systems. For your reference consider reading the source code for AIOETHW.dll provided with your software install. More information is available in the HTML API reference installed in your software directory

Packet Structure

A packet is a byte-lengthed string; the first byte is the length(in bytes) of the body. A packet's body consists of a 4-byte ASCII type and zero or more bytes of payload.

Defined packet types are as follows:

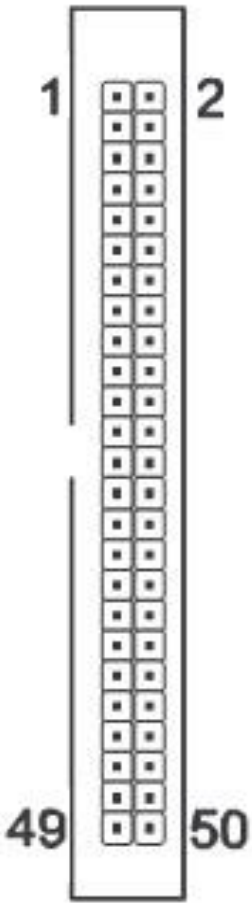
Type	Direction	Meaning	Payload
ChNW	M>S	Change network settings.	IP address, subnet mask, and gateway IP address, each in 4-byte big-endian format. For example, C0 A8 01 AE FF FF 00 00 C0 A8 01 01 for 192.168.1.174, 255.255.0.0, and 192.168.1.1. Device should reply with **W_OK** or **_Err**.
ChIP	M>S	Change IP address.	4-byte big-endian IP address. For example, C0 A8 01 AE for 192.168.1.174. Device should reply with **W_OK** or **_Err**.
ChSN	M>S	Change subnet mask.	4-byte big-endian subnet mask. For example, FF FF 00 00 for 255.255.0.0. Device should reply with **W_OK** or **_Err**.
ChGW	M>S	Change gateway IP address.	4-byte big-endian gateway IP address. For example, C0 A8 01 01 for 192.168.1.1. Device should reply with **W_OK** or **_Err**.
RSta	M>S	Read status.	No payload defined at this time. Device should reply with **R_OK** or **_Err**.
RADI	M>S	Read "all" DIO data.	No payload defined at this time. Device should reply with **R_OK** or **_Err**.
RPDI	Reserved for reading partial DIO data.		
WADO	M>S	Write "all" DIO data.	1-byte length of DIO data, then DIO data. For example, 06 01 02 04 08 10 20 to set bit 0 on the first byte of DIO, bit 1 on the next byte of DIO, etc. up to bit 5 on the last byte of DIO. Device should reply with **W_OK** or **_Err**.
WPDO	M>S	Write partial DIO data.	1-byte length of mask+DIO data, then mask, then DIO data. Each bit set in mask corresponds to a bit in DIO data to write. For example, 0C 03 00 00 00 00 00 01 00 00 00 00 00 to set bit 0 high and bit 1 low on the first byte of DIO, without changing bits 2-7 or any other byte. Device should reply with **W_OK** or **_Err**.
W_OK	S>M	Write succeeded.	1-byte length of written data. For example, 01 to indicate success of a 1-byte write.
R_OK	S>M	Read succeeded.	1-byte length of read data, then read data. For example, 03 42 49 4F to read 42h, 49h, and 4Fh.
_Err	S>M	Transaction failed.	4-byte little-endian Windows error code. For example, 42 00 00 00 for ERROR_BAD_DEV_TYPE, indicating read from a write-only device or vice versa.

Table 5-1: Packet Type Definitions

Chapter 6: Connector Pin Assignments

Two 50-pin male headers are provided for I/O connections designated as P2 and P3, which are also referred to as Groups 0 and 1 respectively.

PIN	P2	P3
1	I/O 23	I/O 47
3	I/O 22	I/O 46
5	I/O 21	I/O 45
7	I/O 20	I/O 44
9	I/O 19	I/O 43
11	I/O 18	I/O 42
13	I/O 17	I/O 41
15	I/O 16	I/O 40
17	I/O 15	I/O 39
19	I/O 14	I/O 38
21	I/O 13	I/O 37
23	I/O 12	I/O 36
25	I/O 11	I/O 35
27	I/O 10	I/O 34
29	I/O 09	I/O 33
31	I/O 08	I/O 32
33	I/O 07	I/O 31
35	I/O 06	I/O 30
37	I/O 05	I/O 29
39	I/O 04	I/O 28
41	I/O 03	I/O 27
43	I/O 02	I/O 26
45	I/O 01	I/O 25
47	I/O 00	I/O 24
49	+5VDC	+5VDC



PIN	FUNCTION
2	GROUND
4	GROUND
6	GROUND
8	GROUND
10	GROUND
12	GROUND
14	GROUND
16	GROUND
18	GROUND
20	GROUND
22	GROUND
24	GROUND
26	GROUND
28	GROUND
30	GROUND
32	GROUND
34	GROUND
36	GROUND
38	GROUND
40	GROUND
42	GROUND
44	GROUND
46	GROUND
48	GROUND
50	GROUND

Table 6-1: 50-Pin Connector Pin Assignments

Signal Name	I/O	Signal Description Name
I/O0 through I/O47	I/O	Digital I/O lines, configurable as inputs or outputs in groups of 8 bits, pulled up or down through 10Kohms or floating
+5VDC	O	Sourced voltage output via 0.5A resettable fuse
GROUND	-	Ground reference connection

Table 6-2: I/O Connector Signal Names, Directions and Descriptions

Chapter 7: Specifications

Digital I/O (TTL Compatible)

Channels / Groups: 48 or 24 in 8-bit groups
Inputs:
- Logic High: 2.0 VDC minimum, 5.5 VDC max.
- Logic Low: -0.5 VDC minimum, 0.8 VDC max.
- Bias Resistors: 10K Ω

Outputs:
- Logic High: 2.0 VDC minimum, source 32 mA
- Logic Low: 0.55 VDC maximum, sink 64 mA

Sample rate: Up to 2500 round-trip DI/O Read/Write transactions per second
Note: performance is critically affected by network traffic

Bus Type

Ethernet 10/100 Base T, Auto-detecting 1.5kV Isolation

Environmental

Operating Temp.: 0˚C to 70˚C (Extended Temp version operates from -40˚C to +80˚C)
Storage Temp.: -40˚C to +85˚C
Humidity: 5%-90% RH, non-condensing

Mechanical

Board Dimension: 3.550 x 3.775 inches
Box Dimension: 4.00 x 4.00 x 1.7 inches
Connectors
- I/O: Dual row 0.1” 50 pin shrouded headers with grounds on all even pins
- DC power jack: 2.0mm positive center post (for use primarily with AC/DC converters, or “wall-warts”)
- DC power screw terminals available via enclosure cutout

Power

Basic 48 bit unit: +5VDC from external regulated power supply, <300mA typical (no load)
Auxiliary Outputs: +5VDC via one 0.5A resettable fuse for both connectors
Max power consumption is 2.0A under full load conditions (all I/O’s configured as outputs sourcing 32mA each and 500mA draw from +5VDC fused outputs.)

Customer Comments

If you experience any problems with this manual or just want to give us some feedback, please email us at: ***manuals@accesio.com***. Please detail any errors you find, we will reply with manual updates.

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